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ABSTRACT

An improved optical photolithography system and method provides predetermined light patterns generated by a direct write system without the use of photomasks. The Direct Write System provides predetermined light patterns projected on the surface of a substrate (e.g., a wafer) by using a computer controlled ~~means~~ component for dynamically generating the predetermined light pattern, e.g., a spatial light modulator. Image patterns are stored in a computer and through electronic control of the spatial light modulator directly illuminate the wafer to define a portion of the polymer array, rather than being defined by a pattern on a photomask. Thus, in the Direct Write System each pixel is illuminated with an optical beam of suitable intensity and the imaging (printing) of an individual feature is determined by computer control of the spatial light modulator at each photolithographic step without the use of a photomask. The Direct Write System including a spatial light modulator is particularly useful in the synthesis of DNA arrays and provides an efficient ~~means~~ element for polymer array synthesis by using spatial light modulators to generate a predetermined light pattern that defines the image patterns of a polymer array to be deprotected.